Basic J-Pole Antenna for the 220mHz Band (1.25 Meter band)

By HamUniverse

The 220mHz ham band is the least popular ham band in the VHF/UHF portion of the ham bands. It is not used nearly as much as the 2 meter or the 440 ham bands in the U.S.

According to Repeaterbook.com, there are 81 220mHz repeaters compared to 608 2 meter repeaters in Texas as of this article date, 02-2014.

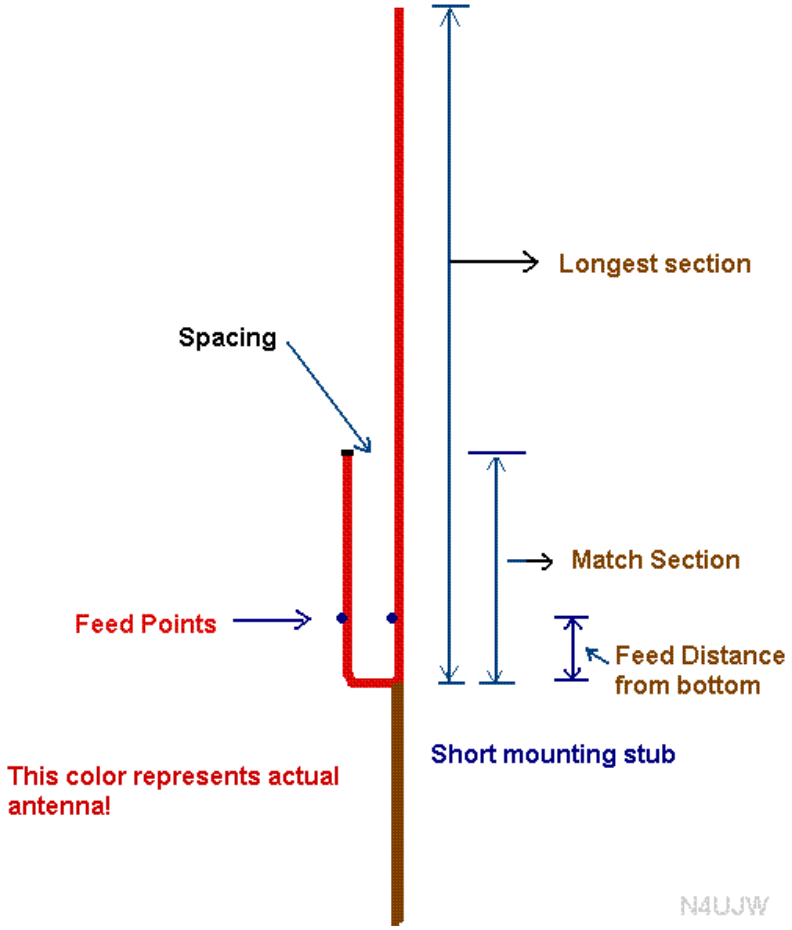
But if you have "220" repeaters near you and wish to try your skill at building an antenna and operating on this fun band...read on!

The J-pole antenna is an end-fed omnidirectional dipole antenna that is matched to the feedline by a quarter wave transmission line stub. Matching to the feed-line is achieved by sliding the connection of the feedline back and forth along the stub until a VSWR as close as possible to 1:1 is obtained. Because this is a half-wave antenna, it will exhibit gain over a quarter-wave ground-plane antenna. This article will get you started in building the J Pole antenna for the 220 ham band, also called the 1.25 meter band. The specific lengths, etc in this article are for the center of the FM repeater input frequency of the band.

The J-pole antenna is somewhat sensitive to surrounding metal objects, and should have at least a quarter wavelength of free space around it. The J-Pole is very sensitive to conductive support structures and will achieve best performance with no electrical bonding between antenna conductors and the mounting structure. (This last sentence is debatable and ignored by many builders). Most builders use an air wound choke made from 50 ohm coax at the bottom of the antenna. About 4 to 6 coils of coax formed into a circle usually does the job.

In this article you will find a basic drawing of a J Pole antenna below and the lengths, spacings, and other details to build one for the 200 mHz ham band. More specifically, the article details lengths and spacings for the center of the FM repeater input section of the band.

The 220 band frequency range in the U.S. is between 219mHz and 225mHz so we looked at the ARRL suggested band plan and used 222.8mHz as the design frequency for this project. It is in the center of the repeater portion of the band plan. You may want to consider another frequency if needed and adjust the lengths and feed point connections as needed.



Note in the drawing above the wording, "This color represents the actual antenna!", refers to the red/orange color, not the brown color to the right of the wording. That is the support for the J pole.

In the drawing above, you will see one long vertical element "spaced" a short distance from a shorter vertical element and connected at the bottom. This is called the "spacing" as you will see later in the lengths section of this article below. The feed points, noted by the dots in the drawing near the bottom, are actually connected to a part of the lower matching section that consists of a 1/4 wave section. These feed points are the connection points for the coax feed line. The shield of the coax connects to the SHORTEST ELEMENT. The center conductor connects to the longest element. You will want to make these connections temporary at first for swr tuning.

They are adjusted up or down equally from the bottom "U" spacer for best swr after the antenna is built and installed.

Most builders use small copper tubing and 90 degree copper elbows for the construction. However there are other methods of building the J pole antenna. Copper tubing is used for its' strength.

Also most builders use one single very long length of copper tubing for the entire longest vertical section by using a "T" copper fitting at the junction (where the color turns from brown to the different color in the drawing at the bottom of the matching section.)

Below are the lengths for a J pole designed for a center frequency of 222.8 mHz.

37.92 inches Longest element (not including) the support below it.

12.6 inches Short element

1.2 inches Spacing from longest element to shortest (metal to metal, not center to center)

1.2 inches Starting point up from the bottom for matching (adjust as needed for lowest swr) When you achieve your lowest swr, then attach the feed connections securly.
(These lengths and measurements were taken from the J pole antenna calculator on this page.) Note that if your swr is at or very near 1:5 to 1 *using the starting point of 1.2 inches*, you need not try to be a perfectionist unless you are!

The formulas used for designing a J Pole antenna are as follows:

Total length (1/2 wave element) 705 / frequency of use = feet
Short length (1/4 wave element) 234 / frequency of use = feet
Feed Tap Point up from bottom) 23 / frequency of use = feet
Spacing between long and short sections 22 / frequency of use = feet

Multiply feet X 12 to convert to inches.